

## Nanooptics and nanophotonics

### Nonlinear optical characterization of the KDP single crystals with incorporated titania, alumina and zirconia nanoparticles

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It is known that the incorporation of metal oxides (MO) nanoparticles (NPs) is a promising way to improve the nonlinear optical (NLO) properties of commercially used KDP crystals. Recently it was shown the significant improvement of the NLO response as well as the second harmonic (SH) and supercontinuum generation efficiency (up to 70 % at picosecond [1] and more than twice at femtosecond [2] excitation regimes correspondingly) of the KDP single crystals with incorporated titania NPs.

In this work we study the impact of NPs incorporation of different MO (titania, alumina, zirconia) and their polymorphs on the refractive and absorptive NLO response and SH generation efficiency of KDP single crystals. The characterization was performed within the self-action of picosecond (42 ps) and excitation by nanosecond (1 ns) laser pulses at 1064 nm correspondingly. Each kind of the MO NPs has specific manifestation in photoinduced refractive index variations and SH generation efficiency of nanocomposites. The effect is determined by the interaction of MO excited interface with proton network in the KDP matrix.

1. . Gayvoronsky V.Ya, Kopylovsky M.A., Brodyn M.S, Pritula I.M., Kolybayeva M.I., Puzikov V.M. Impact of incorporated anatase nanoparticles on the second harmonic generation in the KDP single crystals // *Las. Phys. Lett.* - 2013. – **10**. - P. 035401.
2. Golovan L.A., Ozheredov I.A., Shkurinov A.P., Usenov I.E., Gayvoronsky V.Ya., Kopylovsky M.A., Pritula I.M. Anomalous Enhancement of Supercontinuum Generation Efficiency in KDP Crystals Incorporated with Anatase Nanoparticles. *Int. Conf. ICONO\LAT 2013. - Moscow, Russia. - 2013.*